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Illustrations of a Law of Evolution of Thought. By Joseph LeConte. 8vo, pp. 20. 1881. From the author.

The Kames of Maine. By George H. Stone. 8vo, pp. 38, map. 1880. From the author.

Medical Electricity. By S. V. Clevenger, M.D. 8vo, pp. 16, cuts. Reprint from the Chicago Medical Journal and Examiner, Nov. 1881. Chicago, 1881. From the author.

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GENERAL NOTES.

BOTANY.[1]

Mimicry in Fungi.—"Instances of mimicry are not rare amongst fungi. They are more frequently attractive than protective mimicries. They may be of vegetable, of animal, or of excrementitious substances, either as regards external appearance, or as regards odor. The main object of these mimicries is the attraction of insects, the advantages of which to plants are: (1), either fertilization of hymenomycetous spores by co-specific spermatia from other individuals, or by the transportation of spores from the hymenium of one fungus to that of another, or perhaps increased germinative energy to the spores is obtained by the admixture of other co-specific spores without the element of sexuality; (2), the diffusion of the fungus spores by insects as well as by the larger animals."—*Grevillea.*

Simblum rubescens Gerard, in Iowa.—Two years ago W. R. Gerard described and figured a new species of fungus in the *Bulletin of the Torrey Botanical Club.* It was discovered on Long Island, and was found to be a species of Simblum, a genus of the Phalloidei, the Stink-horn family. No species of Simblum had previously been known to exist outside of the tropics, *S. periphragmoides* occurring in the Mauritius islands, *S. gracile* in Ceylon, *S. flavescens* in Java, *S. pilidiatum* and *S. sphærocephalum* in South America. Such being the distribution of the known species, it must be regarded as remarkable that one should be found in North America, and Mr. Gerard was justified in questioning whether his specimens might not have grown from spores or mycelium brought in ballast from the tropics, especially as we understand they were found at no great distance from "ballast dumpings."

This question is settled, however, by its discovery in Central Iowa in October of the past year. A dozen or more plants were found in a field by C. L. Spencer, a student in the Agricultural College. Good specimens were secured and placed in alcohol for study in the laboratory. In only one particular do the Iowa specimens disagree with the description given by Mr. Gerard. To our plant Schlechtendal's remark as to the odor of an allied species *does* apply very forcibly, for it certainly does "stink fürchterlich."

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[1] Edited by Prof. C. E. Bessey, Ames, Iowa.

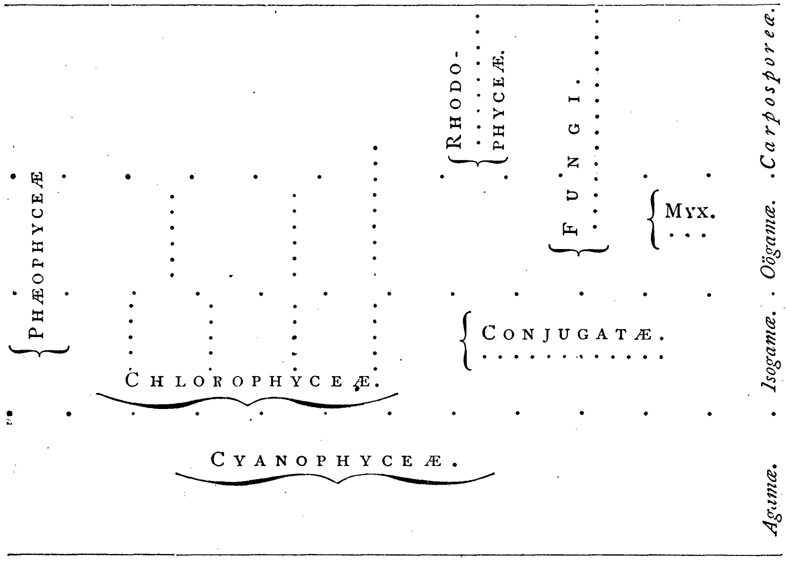
THE ASPARAGUS STEM FOR LABORATORY STUDY.—This plant affords as interesting and instructive an example of the stem of Monocotyledons as the now generally used pumpkin stem does of the Dicotyledons. It is so common that every botanical laboratory can be supplied with it, and its early appearance, and long-continued growth make it possible to secure fresh specimens during many months of the year. The new shoots, such as are sold in the markets, if placed in alcohol afford good material for study, although we have found it a better plan to make all the sections we wanted of fresh stems and then to preserve these sections in alcohol. Thus some cross and longitudinal sections of the very young stems we made early last year are still in most excellent condition for study. Not the least interesting feature of the asparagus stem is its provision for increasing its diameter by the subsequent formation of fibro-vascular bundles in a sub-cortical meristem zone. This will afford material for much careful study on the part of students in the laboratory.

THE ABUNDANCE OF FRESH-WATER ALGÆ.—The excessively wet autumn in Central Iowa caused an unusual growth of fresh-water Algæ. Every pond and ditch was filled with *Spirogyra*, *Zygnema*, *Vaucheria*, etc , until the first of November. Usually our waters are nearly barren of these growths so late in the season, but this year the continued wet weather, instead of the usual drouth, favored their development. The same causes doubtless produced the unusually large amount of autumn blooming of our spring flowers which was noticeable at the same time.

THE SYSTEMATIC ARRANGEMENT OF THE THALLOPHYTES.—If we except England and America, where a morbid conservatism seems to prevail, there has been a great deal of activity recently among botanists with reference to a better arrangement of the plants lying in the great region below the mosses, and to which Endlicher gave the name of the Thallophyta. Thus Cohn, in 1872, published in *Hedwigia*, an outline of a classification, in which the old groups Algæ, Fungi and Lichenes were no longer maintained in their integrity. Shortly afterwards (in 1873) Fischer proposed an arrangement which bears a striking similarity to Sachs'. These two are briefly given in our "Botany for High Schools and Colleges," and need not be repeated here. Sachs' now famous arrangement was published in the fourth edition of his *Lehrbuch*, which appeared in 1874. This has been somewhat modified by various authors, notably by Professor A. W. Bennett, who, in 1880, proposed to restore the groups (classes) Algæ and Fungi, subdividing them, however, into sub-classes by making use of Sachs' structural characters. This was republished in the NATURALIST for January, 1881.

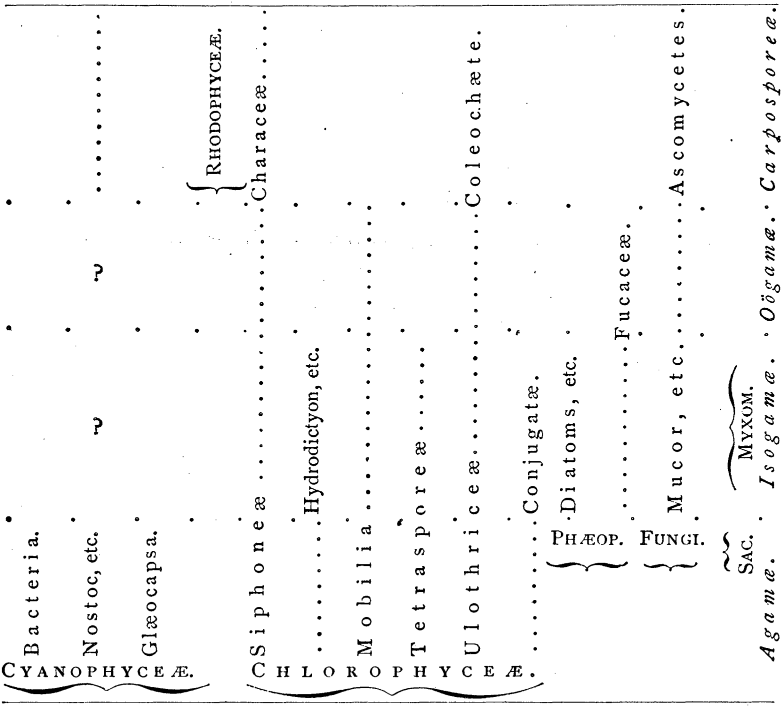
De Bary, in January of the present year, published in the *Botanische Zeitung* a scheme of a systematic arrangement of the

Thallophytes, involving some interesting points. In this seven classes, viz: the Cyanophyceæ, Chlorophyceæ, Conjugatæ, Phæophyceæ, Fungi, Myxomycetes and Rhodophyceæ, are recognized. These classes are regarded as genetic groups, which often include plants of very different structural rank. The Cyanophyceæ are thus all Agamæ, while the Chlorophyceæ are, for the greater part, Isogamæ, with three of its five branches extending into the Oögamæ, and one into the Carposporeæ. Phæophyceæ originating in the Isogamæ, extend into the Oögamæ; similarly the Fungi, which have their origin in the Oögamæ extend into the Carposporæ. The Conjugatæ are all Isogamæ, the Myxomycetes all Oögamæ, and the Rhodophyceæ all Carposporæ. Thus it is seen that De Bary has attempted to retain the integrity of the groups which European algologists have generally recognized, and at the same time to make use of Sachs' structural classification. It may be understood from the following diagram:



Cohn's later attempt was sketched in the June NATURALIST of the past year, and Caruel's in the October number. We have now another (*Bot. Zeitung.* Aug. 12, 1881) by Christoph Gobi, curator of the Herbarium of the University of St. Petersburg. This last bears a close resemblance to De Bary's in that Sachs' system is preserved for indicating structural rank; thus we have the Agamæ (Protophyta of Sachs), Isogamæ (Zygosporeæ of Sachs), Oögamæ (Oösporeæ of Sachs) and the Carposporeæ; further, the genetic series (or classes) include plants of different structural rank, the Cyanophyceæ being mostly Agamæ with a doubtful higher representation, the Rhodophyceæ all Carposporeæ, the

Chlorophyceæ and Fungi, each including the four structural forms, and the Phæophyceæ some Agamæ, Isogamæ and Oögamæ. The Saccharomycetes and Myxomycetes are outlying groups, respectively, of the agamic and isogamic Fungi. The following diagram will serve for comparison with the preceding one:



Gobi, after remarking upon the inappropriateness of the name Thallophyta, and the difficulty of fixing upon such characters as will set off distinctly the plants of this group from those of all others, suggests the new name of Glœophytæ, from the slimy nature of most of the species. We trust that this new name will not be adopted, for while there can be no exception taken to Gobi's criticisms upon the use of the term Thallophyta, the real difficulty lies in the attempt to combine in one great group, plants which have too many structural differences. In our opinion, the Thallophytes include several distinct grand divisions of the vegetable kingdom, just as the Cormophytes do. Old names generally live long after their usefulness has ceased, as witness Cryptogam, Endogen, Exogen, and in zoölogy the term Invertebrata, and doubtless it will be many years before we shall be rid of Thallophyta, but certainly we should not now add another to the long list of those which are to be forgotten.

It is significant that in all these recent attempts at a methodical disposition of these plants, the lichens do not appear as a distinct class, but are placed with the Ascomycetes (fungi), being regarded by most as an order of this class. This indicates the pretty general acceptance of Schwendener's views as to the nature of lichens, or, at the least, of some very considerable modification of the old view.

There are hopeful indications of a gradual settling down upon nearly the lines of demarkation first roughly drawn by Sachs. It may be that Sachs' names will not be retained, and, indeed, it may be questioned whether some of the more recently suggested ones are not preferable. However, we prefer Protophyta to Agamæ, while Isogamæ and Oögamæ are certainly not much preferable to Zygosporeæ and Oösporeæ. Zygophyta, Oöphyta and Carpophyta would be better in many respects than any yet suggested.

The Slime Moulds (Myxomycetes) sadly puzzle the botanists. Their old position near the puff-balls (in the Carposporeæ) they have hopelessly lost, while their right to a place in the Oösporeæ (De Bary) or the Zygosporeæ (Sachs and Gobi) is exceedingly doubtful. We agree with Fischer, Bennet and Caruel in placing them in or near the Protophyta. In view of Saville Kent's recent endeavor to show the animal nature of Slime Moulds, it may not be amiss to repeat here the remark made by us two years ago. "It is by no means an improbable hypothesis that in the Myxomycetes we have the *terrestrial phase* and in the Monera the *aquatic phase* of a common group of organisms. The Myxomycetes are not Monera, but they are moneran in their structure, and probably also in their affinities. All the differences between the Myxomycetes and a Moner like *Protomyxa*, for example, are probably referable to the terrestrial habit of the former as contrasted with the aquatic habit of the latter." ("Botany for High Schools and Colleges," p. 207, foot-note.)

In Bennett, De Bary and Gobi's systems the greatest emphasis is placed upon what may be called genetic relationship, as distinguished from structural relationship. That some account must be taken of genetic relationship in any system of classification needs no argument in these days, but this must not be to the exclusion of structure, and evident structural affinities, lest the prime object of all classification be defeated.—*C. E. Bessey.*

ELECTRIC LIGHT AND PLANT GROWTH.—Dr. Siemens' interesting experiments with plants grown in electric light promise to be of great value not only to the student of vegetable physiology, but to the farmer and gardener as well. It seems to be pretty certain that in continuous light plants grow much more than when darkness alternates with light. Dr. Siemens is, indeed, led to ask whether the darkness of the night does not present a "difficulty to plant life which had to be met," by a special development, instead of affording a period of needed rest. In fact, it begins to look as if the old notion of the need of rest by a plant would have to be abandoned, or at least very greatly modified. One of the most suggestive things brought out in these experiments is the blighting effect of the light from the naked electric light. Plants so exposed became shriveled and scorched, while those situated nearer to the light, but having a sheet of glass interposed, were not so affected.

BOTANICAL NOTES.—In Professor Parker's lecture on "Biology as an academical study," published in *Nature*, there is a most excellent denunciation of the teaching of botany and zoölogy as mere classificatory sciences, and a strong plea for the "laboratory method," which he properly urges for not only the college but for the high school also. "What," says he, "would be thought of a mathematical teacher who relied entirely on lectures, and never dreamed of insisting that his pupils should apply what he had taught by working out examples for themselves? Or what of a teacher of art who ignored the necessity of making his students draw or paint? Every one sees the necessity of practical, and the uselessness of exclusively theoretical teaching in these instances, yet the fact is generally ignored that the case is precisely the same with scientific subjects."——A good service has been rendered by the editor of the *American Monthly Microscopical Journal* in the publication in his journal of the Rev. W. Johnson's "Introduction to the study of lichens." Several wood-cuts help to make the matter so clear that the beginner need have no trouble in taking up the study of these very interesting plants. ——Mr. W. H. Leggett has seen reasons for suspecting cleistogamy in the common purslane (*Portulaca oleracea*), and asks in the October *Torrey Bulletin* for confirmation or disproof.——As showing the incomplete state of our knowledge of the plants of the world, it is significant that *seven new species* of British lichens are described in *Grevillea* for September. If species are discoverable at that rate in a country which has been so diligently worked by collectors, what may we not look for in the world at large! ——Wm. Trelease has been studying the nectar glands upon the leaves of Populus, and finds that they appear as a rule only on the first half dozen leaves of each shoot in early spring. After a long series of careful examinations, the results of which he records in the November *Botanical Gazette*, he concludes that these glands are protective indirectly by attracting ants, ichneumonids and lady-birds, which in turn serve to keep off many harmful insects and larger animals.——From a study of the flora of Madagascar. J. G. Baker ventures in the *Journal of Botany* to estimate the number of species of flowering plants alone at from four to five thousand, a remarkably high number when we consider the limited area covered by it, viz: 228,573 square miles, or a little more than three-fourths the size of the State of Texas.——Macchiati in the October *Nuovo Giornale Botanico Italiano* enumerates the orchids of Sardinia, forty-six species in all.——In the same journal, Professor Passerini continues his enumeration of the fungi of Parma. No less than thirty-two species of Peronosporeæ occur in the Parmensian flora.——The re-issue of the third series of the well-known *Botanical Magazine* is announced, by the publishers, L. Reeve & Co., London.——A second edition of Elliott's "Hand-book of Landscape Gardening" has appeared from the house of D. M. Dewey & Co., of Rochester. Botanically, its chief interest lies in the numerous very poor colored plates, the publisher has added. It is to be hoped that no horse-chestnut like the one figured in this book ever existed. There can be no excuse for such wretched plates, and for the numerous typographical blunders, which disfigure the work. However, we do not doubt, that the book may be useful to many who wish to improve their grounds.

ZOÖLOGY.

OBSERVATIONS ON THE SPECIES OF PLANARIANS PARASITIC ON LIMULUS.—During the present summer, while engaged in investigating food-fishes under the auspices of the U. S. Fish Commission, near the mouth of the Chesapeake bay, a fine large female specimen of *Limulus polyphemus* was brought to me from one of the pound nets near by, into which it had strayed. Upon making an investigation of the creature's anatomy, I discovered a great number of parasitic planarian worms infesting the gills, and adhering to the leaflets of the latter were many thousands of egg capsules, in which the young worms were undergoing development. From an inspection of a numerous series of these capsules, with the aid of the proper method of sectionizing, it would have been possible to have obtained a full history of the development of the species; for such an investigation the writer was not, however, prepared, nor did he have the time for it, but from the circumstance that there was a great diversity in the size of the capsules, he believes that at least three species of these parasites make the gills of the horse-shoe crabs their nidus. That such parasites infest this animal has apparently been known for a long time. Alexander Agassiz alludes to it under the name of *Planaria angulata* Müller, and Max Schultze in 1873, at Weisbaden, described the animal before the Congress of German Naturalists, but does not appear to have published anything in their transactions. Recently Dr. Ludwig Graff[1] has discussed the subject anew and at greater length and with more thoroughness; but he recognizes but one form, which he calls *Planaria limuli*. Dr. Graff's recognition of but one species is then the excuse for the present notice,

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[1] Kurze Mittheilungen über fortgesetzte Turbellarienstudien. Zoolog. Anzeiger, II, Apr., 1879, pp. 202–205.